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Handling Incoming Label Request for PW FEC Types
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Abstract

This document clarifies the behavior of an LSR PE upon receiving an LDP Label Request message for Pseudowire (PW) FEC types. Furthermore, this document specifies the procedures to be followed by the LSR PE in order to answer such requests for a given PW FEC type.

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Convention

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [[RFC2119](#)].

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1 Introduction

Label Distribution Protocol (LDP) base specification [[RFC5036](#)] defines different LDP message types and their procedures for advertising label bindings. These procedures are generic and inherited by any FEC type that is advertised using these message types. For a given FEC type, any difference in behavior, compared to what is already specified in [RFC 5036](#), needs to be spelled out clearly in the corresponding specification in which the FEC type is being introduced or extended.

[[RFC4447](#)] specifies mechanisms to setup pseudowires (PWs) using LDP. [[RFC4447](#)] does not specify any behavior change with regards to label binding distribution for PW FEC types in response to a corresponding Label Request message from a peer LSR PE. This implies that [[RFC4447](#)] inherits the base procedures defined in [[RFC5036](#)] for Label Request and associated response for a PW FEC type. The lack of specification in the area of Label Request in [[RFC4447](#)] has led to some interoperability issues between vendors due to different interpretation. For example, there are some implementations which do not honor and do not respond to an incoming Label Request for a PW FEC type, resulting in functionality impact. Some of these problems are very critical for the deployment of PW technologies. The following is a non-exhaustive list of some of the problems and potential breakages that may result due to the lack of support of incoming Label Request for a PW FEC:

- An LSR PE can not restart forwarding of packet with sequence number 1 as specified in [section 4.1 of \[RFC4385\]](#) with regards to Control Word Sequencing.
- An LSR PE may not be able to perform a PW consistency check as defined in [section 4.1 of \[RFC6667\]](#), resulting in LSR PEs becoming out-of-sync.
- Some implementations of LSR PE do not checkpoint PW label bindings learnt from peer(s) in their persistent memory and hence are not able to recover any peer state after their own restarts or switchovers. Such implementations typically require re-learning of peer's label bindings after their own failure and rely on Label Request mechanisms.
- The combination of Downstream Unsolicited mode and Conservative Label retention (used due to memory limitations) can lead to a situation where an LSR PE releases the label learnt from a peer for a PW that it may need later. Label Request is used to solve this issue. For example, consider an LSR PE operating in Label Conservative mode receiving a label binding for a

non-locally configured/known PW. This LSR PE ignores such a label binding and later tries to re-learn it via Label Request procedure once PW is locally configured. The authors will like to remind the readers about the following fact: [\[RFC4447\]](#) does not mandate to use Label Liberal mode. Therefore it is possible that some implementation used Label Conservative mode.

This document clarifies the use of Label Request message and its procedures for PW FEC types and re-enforces the acceptable behavior to be implemented by an LSR PE.

2. Requirements

This document recommends the following action to be implemented by an LSR PE that supports a PW FEC Type (P2P or P2MP type):

- An LSR PE MUST respond to an incoming Label Request message for a PW FEC by sending its local binding for the PW via a Label Mapping message. If no such binding is available, the LSR PE SHOULD respond by sending a new status code "No PW" in a Notification message.
- An LSR PE MUST respond to an incoming Label Request message for a Wildcard FEC [\[RFC5036\]](#) by sending its local bindings for all its PWs via Label Mapping messages. This is in addition to label bindings corresponding to any other LDP FEC types configured and available at the LSR.
- An LSR PE MUST respond to an incoming Label Request message for a Typed Wildcard PW FEC [\[RFC6667\]](#) by sending its local bindings for all its PWs for the given FEC type via Label Mapping messages. For a given PW FEC type, this advertisement is to be scoped either for a specific PW type or for all PW types according to the received PW Typed Wildcard FEC.

3. Procedures

This document re-enforces the Label Request generic procedures, as defined by [RFC 5036](#), for PW FEC types, and hence strongly recommends that an LSR PE receiving the PW Label Request message should respond either by sending its label binding in Label Mapping message(s) or with a Notification message indicating why it cannot satisfy the request.

An LSR PE should respond to a Label Request when corresponding PW FEC is resolved locally. The following sub sections define the meaning of a "resolution" for a given PW FEC type.

[3.1](#) Pwid FEC (FEC128)

A Pwid FEC is resolved when a local label binding has been allocated after local configuration application.

[RFC6073] does not preclude setting up MS-PWs using FEC-128, therefore this procedure is also applicable to PEs acting as S-PEs.

[3.2](#) Generalized Pwid FEC (FEC129):

A Generalized Pwid FEC is resolved at an ST-PE when SAII is locally configured, TAII is learnt statically or dynamically via discovery mechanisms, and a local label binding has been allocated.

This FEC is resolved at an TT-PE when SAII is locally configured, TAII is learnt statically or dynamically via discovery mechanisms, remote label binding is received, and a local label binding has been allocated.

Whereas, this FEC is resolved at an S-PE when remote label binding is received for PW segment, TAII is learnt statically or dynamically via discovery mechanisms, and a local label binding has been allocated.

[3.3](#) Common to Pwid and Generalized Pwid FEC

A FEC is resolved at an S-PE when remote label binding is received for PW segment.

In the case of Generalized Pwid FEC, TAII is learnt statically or dynamically via discovery mechanisms, and a local label binding has been allocated. Whereas Pwid FEC is resolved when a local binding has been allocated.

[3.4](#) P2MP PW Upstream FEC (FEC130):

Editor Note: Deferred for further study.

[3.5](#) P2MP PW Downstream FEC (FEC132):

Editor Note: Deferred for further study.

[3.5](#) PW Typed Wildcard FEC

The rules defined for individual PW FEC types apply equally when they are used under a PW Typed Wildcard FEC [[RFC6667](#)].

[4](#) Acknowledgements

The authors would like to thank for Alexander Vainshtein its reviews and comments of this document.

5 Security Considerations

This document does not introduce any additional security constraints.

6 IANA Considerations

This document requires the assignment of a new LDP Status Code to be used in a Notification message to notify a peer LSR if lookup fails at receiving LSR for a PW FEC received in a Label Request message.

The value requested from the IANA managed LDP registry "LDP Status Code Name Space" is:

Range/Value	E	Description
-----	---	-----
0x00000032	0	No PW

[7](#) References

[7.1](#) Normative References

- [RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), March 1997.
- [RFC5036] Andersson, L., Ed., Minei, I., Ed., and B. Thomas, Ed., "LDP Specification", [RFC 5036](#), October 2007.
- [RFC4447] Martini, L., Ed., Rosen, E., El-Aawar, N., Smith, T., and G. Heron, "Pseudowire Setup and Maintenance Using the Label Distribution Protocol (LDP)", [RFC 4447](#), April 2006.
- [RFC6667] Raza, K., Boutros, S., and Pignataro, C., "LDP Typed Wildcard FEC for Pwid and Generalized Pwid FEC", [RFC 6667](#), July 2012.

[7.2](#) Informative References

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